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| APPLICATION NO. | FILING DATE | FIRST NAMED INVENTOR | ATTORNEY DOCKET NO. | CONFIRMATION NO. |
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| 10/828,676 | 04/21/2004 | Richard X. Gu | TI-37591 (1962-10900) | 4466 |
| 23494 | 7590 | 07/27/2005 | EXAMINER | |
| TEXAS INSTRUMENTS INCORPORATED P O BOX 655474, M/S 3999 DALLAS, TX 75265 | | | GOODLEY, JAMES E | |
| | | | ART UNIT | PAPER NUMBER |
| | | | 2817 | |

DATE MAILED: 07/27/2005

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

10/828,676

Applicant(s)

GU, RICHARD X.

Examiner

James E. Goodley

Art Unit

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 22 July 2005.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-11 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-11 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 21 April 2004 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.
- Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
- ☐ Certified copies of the priority documents have been received.
 - ☐ Certified copies of the priority documents have been received in Application No. _____.
 - ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☒ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)
Paper No(s)/Mail Date 04/21/2004.
- 4) ☐ Interview Summary (PTO-413)
Paper No(s)/Mail Date. _____.
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other: _____.

DETAILED ACTION

Claim Rejections - 35 USC § 102

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

Claims 1-3 and 8-9 are rejected under 35 U.S.C. 102(e) as being anticipated by ***Afghahi (US 6870431)***.

Regarding **claims 1-3, 8 and 9**, Fig. 1, lines 66-67 of column 1 and lines 1-36 in column 2 of Afghahi shows an oscillator circuit comprising a plurality of ring oscillators [path through A1-A2-A3-FB1 and path through A4-A5-A6-FB2] further comprising three stages each [inverters A1-A3 and A4-A6], wherein each stage further comprises an inverter or delay element, wherein each ring oscillator produces an oscillatory output signal [phases $\Theta 1$ - $\Theta 3$ and $\Theta 4$ - $\Theta 6$]; wherein the ring oscillators are cross coupled [via locking circuits L1 and L2]; and wherein each ring oscillator drives only one other ring oscillator.

Claim Rejections - 35 USC § 103

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The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

Claims 4-6 and 10-11 are rejected under 35 U.S.C. 103(a) as being unpatentable over Afghahi.

Regarding claims **4-6 and 10-11**, Afghahi shows the oscillator circuit of claim 1 and suggests but does not specifically disclose in lines 22-32 of column 3 that adding more or fewer amplifiers could be used in each ring oscillator depending on the number of phases required for the application at hand, and in lines 31-36 of column 2 that additional cross-couplings may be added to the circuit, thus creating additional ring oscillators.

It would have been obvious to one of ordinary skill in the art at the time the invention was made to modify the circuit in Fig. 1 of Afghahi to include eight inverting cells, cross-coupled to make 4 ring oscillators, such that each ring oscillator comprises 3 stages and produces a four phase, quadrature clock, with outputs varying in phase from each other by 90 degrees for the purpose of obtaining a desired number of clocking phases and a desired operating frequency to use in a particular clocking application.

Claim 7 is rejected under 35 U.S.C. 103(a) as being unpatentable over Afghahi in view of **Arcus (US 6426662)**.

Regarding **claim 7**, Afghahi shows the oscillator circuit of claim 1, except “a plurality of ring oscillators wherein each ring oscillator produces an oscillatory output signal, wherein the ring oscillators are cross coupled such that each ring oscillator drives only one other ring oscillator, wherein the plurality of ring oscillators implement differential signaling and the oscillator circuit further comprises a plurality of cells coupled to the ring oscillators and whose purpose is to reduce timing differences among at least some of the oscillator output signals.” However, lines 10-13 and 38-39 of column 2 and lines 15-18 of column 4 and Fig. 2 of Arcus shows a ring oscillator comprised of inverting delay stages [14A, 14B, 14C, 14D] implementing differential signaling and the oscillator circuit further comprising a plurality of cells [inverting amplifiers at outputs of “DIFF TOGL FF” 20-27] coupled to the ring oscillator and whose purpose is to reduce timing differences among at least some of the oscillator output signals.

It would have been obvious to one of ordinary skill in the art at the time the invention was made to modify the method of Afghahi by the teachings of Arcus to implement differential signaling in a cross-coupling fashion for a plurality of ring oscillators, wherein each ring oscillator drives only one other oscillator and produces an oscillatory output signal for the purpose of better controlling the accuracy and timing of the clock signals.

Conclusion

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The prior art made of record and not relied upon is considered pertinent to applicant's disclosure.

Non patent literature document ***"Voltage Controlled Ring Oscillator with Wide Tuning Range and Fast Voltage Swing"*** by ***Nicodimus Retdian, Shigetaka Takagi and Nobuo Fujii*** discloses methods for constructing a ring oscillator out of inverting or delaying electronic elements.

Fax/Telephone Information

Any inquiry concerning this communication or earlier communications from the examiner should be directed to James E. Goodley. The examiner can normally be reached on Monday-Friday.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Robert J. Pascal can be reached on (571)272-1769. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

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Zakari Smith
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Primary Examiner